to its true cause, the gale, aided undoubtedly by the raised water-level, due partly to the tide, and also partly to the heaping up of the sea against a lee shore by an on-shore gale; whilst the wave-stroke at Peterhead was not due, as implied above, to a tidal rise of 8 feet, but, as mentioned a few pages earlier, to the depth into which the breakwater has been carried, the great exposure of the site, and the large waves, attaining 30 feet in height and 600 feet in length during storms, which, consequently, come against the structure.

Numerous instances have been frankly quoted in the two chapters on wave action and littoral drift of the effect of waves in storms in transporting material along the coast, reference to two of which must suffice:—

> "In the Solent, near Hurst Castle, a shingle bank, 2 miles long and 12 feet high, consisting principally of flints resting on a clay base, was moved forward in a north-easterly direction forty yards during a storm in 1824. . . . During a heavy gale stones weighing from 2 to 3 cwt., with large masses of seaweed growing on them, were loosened from their bed at a depth of fifteen fathoms, and thrown on to the beach."

Compared with the forces displayed by these effects, and the others given in the book produced by waves in storms, the wavelets of the flood tide sink into insignificance; and, thanks to the fairness with which these examples have been given, it may be anticipated that an unbiassed, intelligent perusal of these two chapters will lead to conclusions at variance with those of the author, and that it will be realised that waves in storms are the chief forces producing changes in coasts and littoral drift, exercising their maximum effect during high water of spring tides, and when acting in unison with the tidal currents.

From an engineering point of view, the most interesting part of the book is comprised in the three chapters on coast protection by sea-walls and groynes. Sea-walls formed of embankments with pitched slopes, or more or less upright masonry or concrete walls, serve for directly warding off the attacks of the waves in storms from the shore, cliffs, or sea-drives and promenades; whilst groynes of timber, fascines, or concrete are projected at intervals down the beach to arrest the littoral drift, and by thus gradually raising the strand prevent the sea from eroding the shore. Unfortunately groynes, by collecting the drift along one part of the beach, deprive the unprotected portion further leeward of the supply by which its losses by erosion would be naturally replenished; and, consequently, the advance of a length of foreshore produced by groynes is accompanied by a retrogression of the adjacent portion from the cutting off of the drift. A pitched slope is adopted where the shore to be protected is low and sandy, and where materials for a wall are deficient, as along the coasts of Holland and Belgium; and a wall is resorted to where cliffs line the coast, or a sea-drive is constructed considerably above the beach; and this variety in construction is due to differences in, the conditions rather than, as suggested by the author to differences of opinion amongst engineers. A simple upright wall has advantages for breakwaters over other forms where the bottom is rocky and the depth moderate; but in contrasting Dover pier, which has not been free from injury, with the breakwaters at Cherbourg, Plymouth, and Alderney, the author has fallen into a very common error of overlooking the differences of exposure and depth of water at these sites; for Dover is situated in one of the most sheltered places of the English Channel, whereas Cherbourg is much more exposed, and the breakwaters of Plymouth and Alderney are open to the Atlantic, and the latter extends into a depth of 130 feet at low water. Sea-walls, however, differ very materially from breakwaters in being built near high-water mark, and therefore upright sea-walls are subject to considerable erosion at their toe, from the recoil of the waves dashing against them, which affects even chalk and shale, so that unless the foreshore consists of firm rock, the sea-wall, which is usually curved or battered on the face, has to be founded below the limit of erosion, or more commonly is provided with an apron to protect the portion of the beach near the sea-wall from the breaking and recoiling waves. A stepped face is sometimes given to sea-walls, so as to impede the upward run of the waves and break up the recoil; but the work must be solidly built, and only a moderate width given to the steps, otherwise the reduction of the weight on the face blocks due to their projection might lead to their dislocation under the impact of the waves. The author regards a sea-wall curving on its face from the apron laid at the slope of the beach, to the vertical at the top, as the best form, and no doubt such a form leads the waves from a horizontal to a vertical course with the least practicable opposition; but at the same time, by minimising the impediments, it causes the waves to rise higher above the wall, and the upper portion of the water is driven over the promenade by the gale. In the chapter on "Examples of Sea-walls," several sections of sea-walls are given; and both this and the succeeding chapter on "Groynes" contain many interesting details of these works; and the book as a whole furnishes a considerable amount of information about the coasts of England, which must have involved much time and trouble to collect.

EVOLUTION AND ANTI-MATERIALISM.

Principles of Western Civilisation. By Benjamin Kidd. Pp. vi+518. (London: Macmillan and Co, Ltd., 1902.) Price 15*s.* net.

TO those who, some years back, read Mr. Benjamin Kidd's "Social Evolution" with great interest and learnt much from it, his new book will be a profound disappointment. Undertaking to settle all the great questions with which our civilisation is confronted, it leaves many important facts out of sight and fails to find a remedy for the main evils. The style is ponderous and difficult. In some parts very careful reading is required if the exact meaning is to be made out.

The line of argument followed is this. Evolution has upset all our old philosophies and obliged us to remodel our way of thinking. Since Darwin's time, evolution has undergone a great development in the hands of Weismann. We now see that the future is predominant over the present. The overwhelming proportion of individuals interested in the struggle for existence are yet unborn. The contending races are struggling for "an advantage, probably always far in the future, to which the individual and the present are alike subordinated." In the struggle, "efficiency in the future" (described as "projected efficiency") "is the determining quality," and so the future controls the present.

There are two epochs of social development. In the former of the two, the existing social organisation counted for everything. In the second, "society, with all its interests in the present, is subordinated to its own future." "Projected efficiency" is the secret of success and of progress. The want of it causes stagnation. In the city States of ancient Greece and in ancient Rome, the present was omnipotent. Marcus Aurelius, noble character as he was, represented a decaying system, bounded by the present. With the spread of Christianity, the horizon enlarges and the future becomes predominant. "The visions of Christianity can never be closed within any limitations of the State or of political consciousness." Turning to politics, we find in England at the time of the Revolution a looking beyond the present to the future. But during a later period our philosophers professed creeds that left out of consideration everything that lay beyond the horizon of the present. Bentham, Ricardo, Mill, Herbert Spencer are interested only in living individuals and their relation to the State. On the other hand, Burke says that society is a partnership "between those who are living and those who are dead and those who are to be born." In Germany, progress is hampered by a frankly materialistic philosophy, the philosophy of Marx, which takes no thought of generations yet to come. Among English-speaking peoples there is a conviction that "the principles of the Democracy which our civilisation is destined to realise are incompatible with a materialistic interpretation of history." We look to the future and not to the present. Hence the marvellous progress of our race, in spite of the fact that the average Englishman is averse to liberal ideas. An age of the free-est competition is beginning, from which immeasurable results may be expected. The present astounding expansion of the English-speaking race is as nothing compared with what is to be. And this magnificent future will be due to free competition, which will not be disgraced by the oppression of the workman by the capitalist, or by the barbarism of our present commercial methods. The predominance of the future will make all this possible. The evolutionary process will be projected altogether beyond the present.

All these theories seem to have their origin in Mr. Kidd's strong anti-materialistic convictions. His formula of the future (to propose a brief name for it), which forms the central doctrine of his creed, serves to unite his anti-materialism with the theory of evolution, which, as he maintains, must now be the foundation of all philosophy. A formula that embraces evolution and transcendental anti-materialism must, of necessity, be very vague. The predominance of the future is, therefore, stated in very indefinite terms, so that it may include things which are essentially different. Thus, evolution regards the future of the race—unborn generations—as of the utmost importance. Christianity puts the future life of the individual above his present life. These two views in a mist of grand phrases are put down as the same, or at least as different aspects of the same, truth. The treatment of philosophical systems seems to involve the same confusion of thought. For evolution, Mr. Kidd says, the unborn generations are everything. Evolution, as we all know, is, largely, independent and will go on whatever our philosophy may be; and yet the views of this or that philosopher are treated as of supreme importance, as if the fate of the nation to which he belonge were involved in them.

When we come to the most interesting and best-written chapters, those in which modern trade and its methods are described, there is again much confusion in the theories which are built upon the facts. Competition, especially in America, is more free than it has ever been before. In the future, we are told, there will be still greater freedom. Yet the fierceness of competition is to be held in check by humane laws which will protect the workman from oppression. Capital, too, will not be allowed to exploit the nation for its own advantage. This is an admirable ideal. But how is it to be combined with a freedom of competition such as has never been known before? Mr. Kidd does not help us here. We are only told that to the English-speaking peoples, free as they are from materialism, everything will be possible. Here we may ask a question:—If anti-materialism is the one secret of progress, how is it that in the East, the birthplace of all the great religions, stagnation is the rule?

We feel much the want of some sound biology. Mr. Kidd adopts some of Weismann's most disputed theories, such as that of the immortality of the unicellular organisms. But other views of Weismann's which conflict with his own theories he says nothing about. Weismann holds, for instance, that as soon as the stress of natural selection is relaxed, a species begins to lose the powers that it has gained. It degenerates. Now, this era of free competition, seen at its best in the United States, is really a time of slackening natural selection. Children are cared for better than ever before, so that many of the weakly survive. The deaf are so well taught that they can make a living and marry, and so leave deaf descendants. The competition, in fact, whether between peoples or individuals, does not lead to elimination. The conditions of life have grown softer, and under such conditions there must be, if there is truth in Weismann's contention, physical degeneration, though it may be screened by the constant influx of numbers of the more vigorous members of the European peoples into the New World. On this subject Mr. Kidd does not touch. Yet the tendency to physical degeneration, more than any other phenomenon of our time, causes anxiety to those who watch the drift of our modern civilisation.

Again, as to the main idea of the book, how is it possible that efficiency in the future, "projected efficiency," can decide a struggle that has to be fought out in the present? It is true that some classes of animals, having succeeded in one period in virtue of their specialisation, have, probably because they were so highly specialised, been unable to take a new line and meet new demands made upon them in the succeeding period. But, apparently, this is not what Mr. Kidd means. His formula is made to refer to evolution as it refers to systems of philosophy or to creeds in which the supremely important future controls the present. He owns that the contending races must fight their battles in the present, and yet in some unexplained way "projected efficiency" decides the issue. When we look facts in the face we find that our anti-materialistic philosophy is not saving us from entering upon the same ruinous course on which the French nation has already proceeded far. Our diminishing birthrate shows that there has already begun among our people that artificial limitation of fertility which must, if it continues, bring national decline with it.

We all wish that these evils should come to an end and that the English-speaking peoples should have a magnificent future before them. Towards this, no doubt, an anti-materialistic philosophy is a help. Materialism is incompatible with real greatness in an individual or a nation. So far we may go with Mr. Kidd. But we cannot allow that he has found a formula in which all our great problems—the problems of evolution, civilisation, religion—find their solution. The problems remain as they were. F. W. H.

GALLS.

British Vegetable Galls, an Introduction to their Study By E. T. Connold. Pp. xi + 312. (London: Hutchinson and Co., 1901.) Price 10*s*. 6*d*. net.

THIS beautiful book is a great disappointment. The title, the nice paper, with its broad margin and excellent print, and, above all, the majority of the one hundred and thirty full-page plates paraded, and by no means unjustly so, on the title-page, all promise so much, and yet—on looking beneath the surface we find no depth. Typical examples of the disappointments in store for the reader are furnished by Plates 14 and 15; it would be difficult to over-praise the beauty of the process-work of the former plate, and yet practically all the information the author gives is confined to a few meagre lines on pp. 58 and 60, chiefly concerned with a note as to where the specimen was found. True, more careful search shows that Plate 47 is concerned with the same subject, and somewhat more scientific hints are appended to this on p. 126; but why, in the name of all knowledge, are we not told something of the structure and development of these galls and their contents? Unless we are mistaken, or misled by synonymy, the very example here referred to is a classical one. Did not Dujardin describe the mite in the hazel-buds in 1851? and did not Miss Ormerod and Schlechtendal show that witches' brooms on the alder arise from the irritation set up by similar species? In this connection, also, excellent illustrations of the witches' brooms themselves are given on Plates 1, 16, 17 and 18, with such irritating gossip as "this very interesting tree stands just within the confines of the Park"—"Park," with a capital P!

Now, if we may be permitted to direct the attention of the author (who is the honorary general secretary to the Hastings and St. Leonard's Natural History Society) to the grand opportunity he has missed, pointing out at the same time that scientific experts rarely obtain the chance of putting forth their text illustrated in the superb style of this book, some service may be done in advocation of the cause of that most useful branch of biology—good descriptive field-work in the domain of the borderland between zoology and botany.

It is scarcely too much to say of the present book that if the text to these excellent plates had been nothing more than even a fair account of the insect and its gall, such as is given in a handbook like that of Frank, it would have been one of the most worthy and useful books on the subject—how much more so had the text risen to the level of Adler's admirable study of oak-galls! If local natural history societies would only resist the temptation to be popular, in the sense which implies being merely attractive to superficial and "smart" people, what an immense amount of valuable work might be done along the lines suggested by the present volume, which, disappointing though it is, is sufficiently good to show that the author must be capable of far better work.

We sincerely hope that in a second edition the author will give such notes concerning the structure and development of the galls, the habits of the insects producing them, and their effects on the plants infested by them, as could be obtained from such authors as we have quoted, and from the works of, for instance, Küster, Molliard and other modern investigators; such an account, added to the more extensive notes on field-work which Mr. Connold could evidently bring together—as may be judged from the present samples—should be worthy of the subject, and would be far more welcome to his fellow-lovers of nature than these pages of desert margin with their oases of meagre information, however excellent the latter may here and there be in itself. We are the more constrained to urge this because we understand that the author contemplates a separate book on oak-galls. If the illustrations are as good as these, and the text far better, we shall anxiously look for that book.

THE EVOLUTION OF LIFE.

L'Évolution de la Vie. Par le Dr. Laloy, Sous-Bibliothécaire de la Faculté de Médecine de Bordeaux. Pp. xii + 240. (Paris: Libraire C. Reinwald; Schleicher Frères, 1902.) Price fr. 2·50.

THIS volume is the third of a series being issued in France under the designation of the "Petite Encyclopédie du XX^e Siècle." The object of the work, as set forth in the preface, is the very praiseworthy one of spreading a sound knowledge of the achievements of modern science among the intelligent public in a popular way. As the author points out, the mental equipment of the man of culture of the present time consists of art, literature and *belles-lettres*. Of modern science he knows nothing and cares to know nothing. Even among scientific workers themselves the extreme specialisation necessitated by original work often prevents a general perspective of the whole subject being gained. The trees prevent the individual hewer of wood from seeing the forest as a whole. We have long recognised the need for imparting scientific "culture" to the reading and thinking public in this country, and many excellent series of popular works by our foremost men of science might be mentioned. How far the present work is likely to give French readers a sound idea of modern